

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11)



EP 1 222 900 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
17.07.2002 Bulletin 2002/29

(51) Int Cl. 7: A61B 17/70

(21) Application number: 02000164.0

(22) Date of filing: 08.01.2002

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR

Designated Extension States:

AL LT LV MK RO SI

(30) Priority: 10.01.2001 JP 2001002639

(71) Applicant: Showa IKA Kohgyo Co., Ltd.
Aichi-ken (JP)

(72) Inventors:

• Nohara, Yutaka
Koshigaya-shi, Saitama-ken (JP)

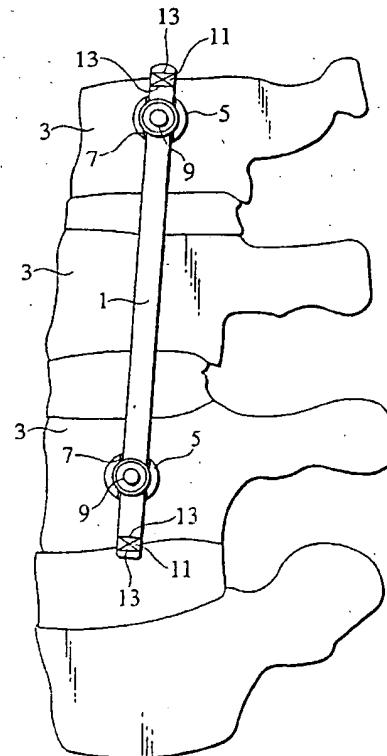
• Oribe, Kazuya
Minato-ku, Tokyo (JP)
• Takamido, Hiroshi
Nagoya-shi, Aichi-ken (JP)

(74) Representative: Schuster, Thomas, Dipl.-Phys.
Grünecker, Kinkeldey, Stockmair &
Schwanhäußer
Anwaltssozietät
Maximilianstrasse 58
80538 München (DE)

(54) Bone setting connecting member

(57) A bonesetting connecting member (1, 17, 19, 21) having an end area supported by a bonesetting tool (5) appropriately mounted to a vertebra (3), thereby connecting the vertebra (3), comprises a polygonal tool engaging portion (11) provided on a body of the bonesetting connecting member (1, 17, 19, 21), and a tool restricting portion (13) for preventing a tool from moving toward opposite sides of the tool engaging portion (11).

FIG.1



EP 1 222 900 A2

Description**BACKGROUND OF THE INVENTION****Field of the Invention**

[0001] The present invention relates to a bonesetting connecting member such as a rod supported at its end area by a bonesetting tool such as a screw as an implant appropriately mounted to a vertebra. More particularly, the invention relates to a bonesetting connecting member capable of being turned appropriately by a tool, and capable of easily moving in its longitudinal direction by the same tool.

Description of the Related Art

[0002] In a conventional bonesetting method of a vertebra, implants such as screws as bonesetting tools are threadedly embedded into separated vertebrae for example, opposite end areas of a rod member having an appropriate shape as bonesetting connecting member are engaged with rod engaging portions provided on heads of the implants, the opposite end areas are fixed by setscrews, thereby integrally fixing the opposite end areas of the bonesetting connecting member to the bonesetting tool.

[0003] When the rod member or the like as the bonesetting connecting member is integrally fixed to the bonesetting tool, in order to combine a curve of the backbone and a curve of the rod member, the rod member is slightly turned around its axis or the rod member is slightly moved in the longitudinal direction in some cases. Some of the conventional rod members are formed with polygonal tool engaging portion on its end so that the rod member can easily be turned around its axis.

[0004] In the above structure, a tip end of the polygonal tool engaging portion of the rod member engages a U-shaped tool and turns the same so that the rod member can be turned around its axis. However, when the rod member is moved in its axial direction, the tool comes out from the tool engaging portion. Therefore, the rod member is sandwiched by holding pawls of another tool having engaging pawls which are capable of opening and closing, thereby moving the rod member in the longitudinal direction, or a tool is abutted against an end surface of the rod member.

[0005] That is, in the conventional method, when the bonesetting connecting member such as a rod member is slightly turned or slightly moved in the axial direction, there are problems that a plurality of tools are required, management of tools is troublesome, and space for bringing the tool against the end surface of the rod member is required.

SUMMARY OF THE INVENTION

[0006] The present invention has been achieved to

solve the above-described problems, and the invention provides a bonesetting connecting member having an end area supported by a bonesetting tool appropriately mounted to a vertebra, thereby connecting the vertebra, comprising a polygonal tool engaging portion provided on a body of the bonesetting connecting member, and a tool restricting portion for preventing a tool from moving toward opposite sides of the tool engaging portion.

10 BRIEF DESCRIPTION OF THE DRAWINGS**[0007]**

Fig. 1 is an explanatory view showing a first example of a mounting state of a bonesetting connecting member to a vertebra;
15 Fig. 2A is an explanatory view showing one mode of a second example of the bonesetting connecting member;
20 Fig. 2B is an explanatory view showing another mode of the second example of the bonesetting connecting member;
25 Fig. 3A is a side view of a third example of the bonesetting connecting member; and
30 Fig. 3B is a front view of the third example of the bonesetting connecting member.

DETAILED DESCRIPTION OF THE PREFERRED INVENTION

[0008] As shown in Fig. 1, a bonesetting connecting member according to a first example of the present invention is indicated with a straight rod member 1. Opposite end areas of the rod member 1 are engaged with engaging grooves 7 formed in heads of a pair of screws (implants) 5 as one example of a bonesetting tool threadedly embedded in a vertebral body (vertebra) 3. Each of the engaging grooves 7 is formed in the head in a direction intersecting with an axis thereof. The opposite end areas are integrally fixed to the screws 5 by means of setscrew 9 threadedly engaged with the head.

[0009] The opposite end areas of the rod member 1 as the bonesetting connecting member are formed with polygonal tool engaging portions 11. The tool engaging portion 11 is of polygonal shape having, e.g., regular hexagonal cross section. A diameter of a circle which is inscribed in the polygonal portion is substantially equal to a diameter of the rod member 1. Therefore, a step is generated between a plane of the tool engaging portion 11 and an outer peripheral surface of the rod member 1, and this step restricts the movement of the tool in an axial direction of the rod member 1. Thus, opposite sides of the tool engaging portion 11 are formed with steps as tool restricting portions 13 for preventing the tool from moving in the axial direction.

[0010] With the above structure, the opposite end areas of the rod member 1 as the bonesetting connecting member are engaged with the engaging grooves 7

formed in the heads of the screws 5 as one example of the bonesetting tool. Prior to integrally fixing by the set-screw 9, a tool (not shown) having a U-shaped tip end is engaged with the tool engaging portion 11 of the rod member 1, and by turning the tool, the rod member 1 can be slightly turned around the axis of the rod member 1.

[0011] Therefore, when the rod member 1 is previously curved appropriately in correspondence with a curve of a backbone for example, the curve of the rod member 1 can be adjusted in the curving direction so the curve of the rod member 1 corresponds to the curve of the backbone. In a state in which the tool is engaged with the tool engaging portion 11, if an attempt is made to move the tool in the longitudinal direction of the rod member 1, the tool restricting portions 13 formed on the opposite sides of the tool engaging portion 11 restrict the movement of the tool. Therefore, the rod member 1 is moved in a desired direction in the longitudinal direction, and a position of the rod member 1 with respect to the screw 5 can easily be adjusted.

[0012] As understood already, according to this embodiment, by engaging the tool with the polygonal tool engaging portion 11, the rod member 1 as the bonesetting connecting member can be turned around its axis and in this state, the movement in the axial direction can be adjusted by the same tool, and rotation and a position in the longitudinal direction of the bonesetting connecting member can easily be adjusted.

[0013] Although the tool engaging portions 11 are provided on the opposite ends of the rod member 1 in the above explanation, the tool engaging portion 11 may be provided only one end, or one or a plurality of tool engaging portions 11 may be provided on a central portion of the rod member 1.

[0014] The bonesetting connecting member is not limited to the straight or slightly curved rod member 1 only, and the bonesetting connecting member may be a substantially J-shaped rod member 17 provided at its one end with a spur (not shown) of a vertebral body 3 or a hook 15 retained with a vertebral arch as shown in Fig. 2A for example, or a polygonal tool engaging portion 11 may be formed at an end area or an appropriate position of a substantially V-shaped (Fig. 2B) or J-shaped (Fig. 2A) rod member 19, and the same effect can be obtained.

[0015] Further, as shown in Figs. 3A and 3B, a mounting portion to a cervical vertebra may be formed as a rod 21. The rod 21 of the bonesetting connecting member is formed with a flat portion 25 as a mounting portion to the braincase. A plurality of mounting holes 23 are formed in the flat portion 25. A polygonal tool engaging portion 11 may be formed on the rod 21.

[0016] The rod member as the bonesetting connecting member need not be, as shown in Fig. 1, straight in shape nor need not be turned around its axis, but if it is necessary to move the rod member in the axial direction, a groove or a flange-like projection may be formed on

an end area of the rod member, a tool may be engaged with the groove or the projection may be brought into abutment against the tool, and by pressing the tool in the axial direction, the rod member may be moved and adjusted in the axial direction.

[0017] In this case, the tool for moving and adjusting the rod member in the axial direction is not limited to a special design only if the tool can be engaged with the groove or the projection. Because a holding pawl or the like that can open and close for holding the rod member is not required, a structure of the tool can further be simplified.

15 **Claims**

1. A bonesetting connecting member having an end area supported by a bonesetting tool appropriately mounted to a vertebra, thereby connecting the vertebra, comprising a polygonal tool engaging portion provided on a body of the bonesetting connecting member, and a tool restricting portion for preventing a tool from moving toward opposite sides of the tool engaging portion.
2. A bonesetting connecting member according to claim 1, wherein said tool restricting portion is provided with a plane of said tool engaging portion and an outer peripheral surface of said bonesetting connecting member.
3. A bonesetting connecting member according to claim 1 or 2, wherein said bonesetting connecting member is a J-shaped member provided at its one end with a hook.
4. A bonesetting connecting member according to claim 1 or 2, wherein said bonesetting connecting member is a V-shaped member comprising a pair of rod members.
5. A bonesetting connecting member according to any of the preceding claims, wherein a cross section of said tool engaging portion is regular hexagon in shape.
6. A bonesetting connecting member according to any of the preceding claims, further comprising a flat portion provided at its one end with a plurality of mounting holes, and a rod connected to said flat portion, wherein said rod is formed with said tool engaging portion, and said tool engaging portion is provided at its opposite sides with said tool restricting portions.
7. A bonesetting connecting member according to any of the preceding claims, wherein the diameter of a circle connected with a polygonal portion provided

on said tool engaging portion is substantially equal to a diameter of said bonesetting connecting member.

8. A bonesetting apparatus comprising a pair of implants adapted to be threadedly embedded in a vertebral body, rods engaging with said implants, and screws for fixing said implants and said rods, wherein each of said rods is formed with a polygonal tool engaging portion, and said tool engaging portion is provided at its opposite sides with tool restricting portions for preventing the tool from moving.

5

10

15

20

25

30

35

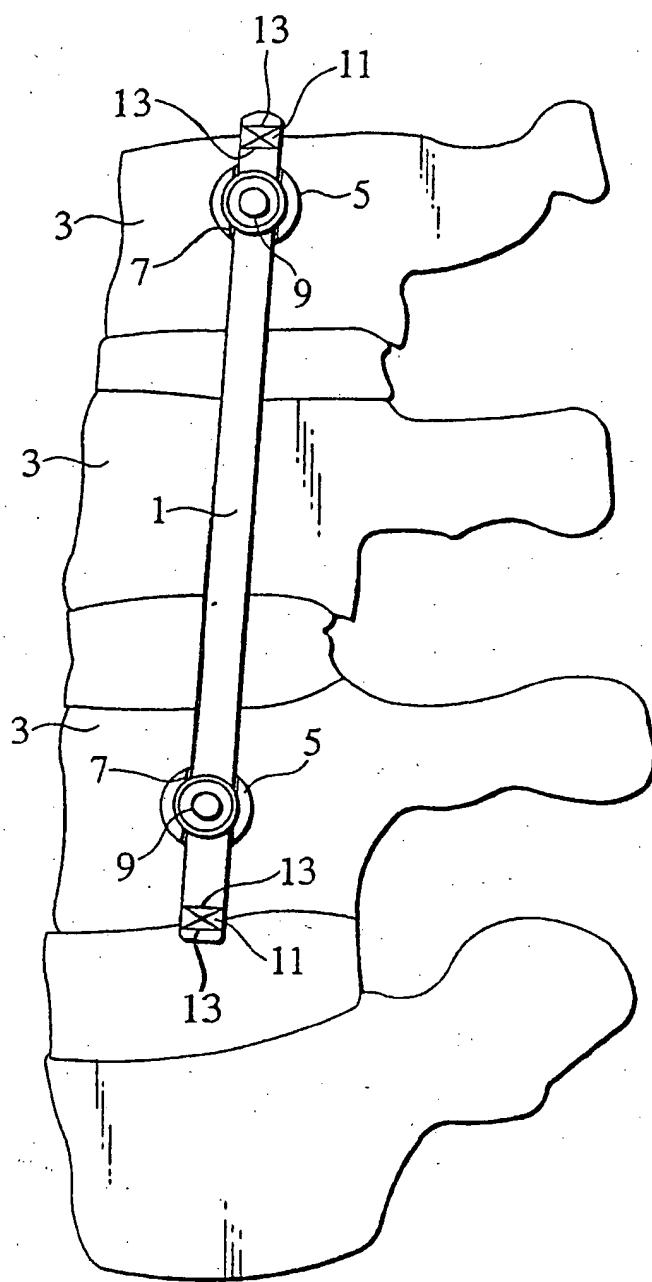
40

45

50

55

FIG.1



THIS PAGE BLANK (USPTO)

FIG.2A

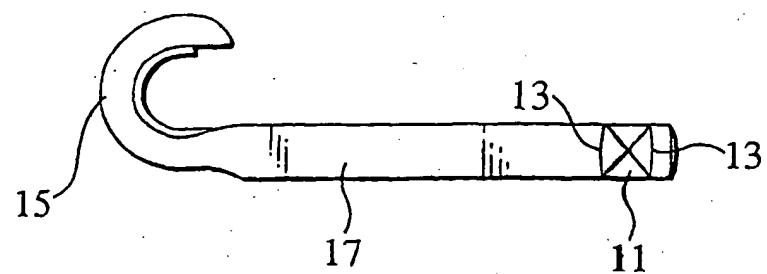
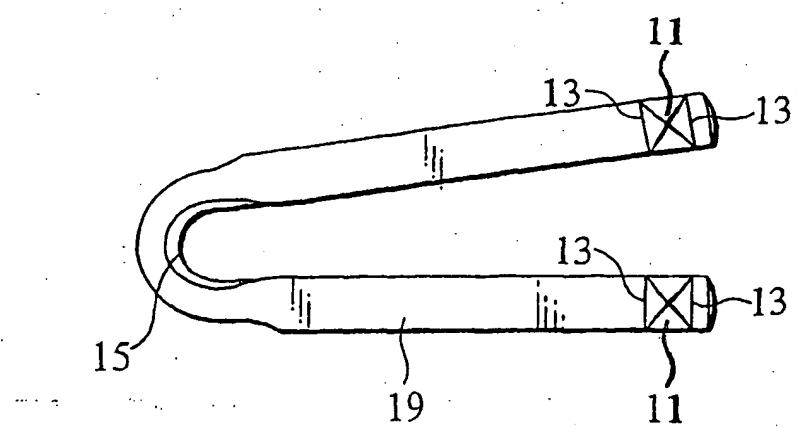


FIG.2B



THIS PAGE BLANK (USPTO)

FIG.3A

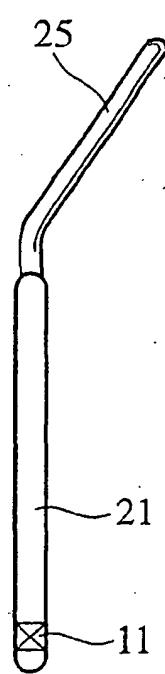
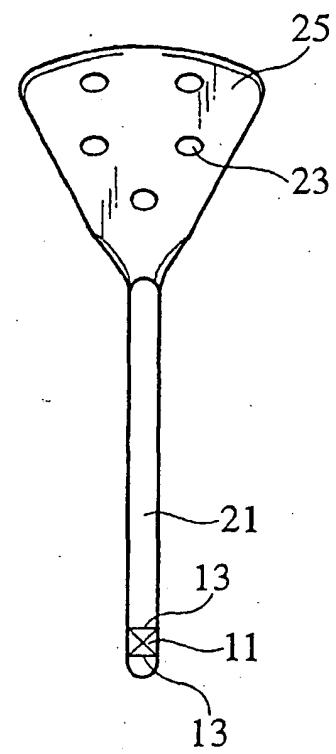


FIG.3B



THIS PAGE BLANK (USPTO)

(19)



Europäisches Patentamt
European Patent Office
Office européen des brevets

(11)

EP 1 222 900 A3



(12)

EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
29.01.2003 Bulletin 2003/05

(51) Int Cl. 7: A61B 17/70

(43) Date of publication A2:
17.07.2002 Bulletin 2002/29

(21) Application number: 02000164.0

(22) Date of filing: 08.01.2002

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: 10.01.2001 JP 2001002639

(71) Applicant: Showa IKA Kohgyo Co., Ltd.
Aichi-ken (JP)

(72) Inventors:

• Nohara, Yutaka
Koshigaya-shi, Saitama-ken (JP)

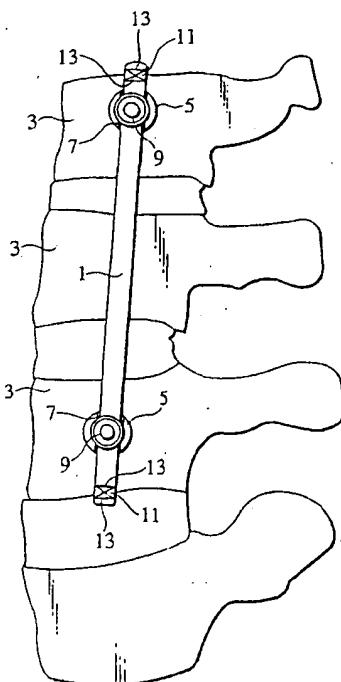
• Oribe, Kazuya
Minato-ku, Tokyo (JP)
• Takamido, Hiroshi
Nagoya-shi, Aichi-ken (JP)

(74) Representative: Schuster, Thomas, Dipl.-Phys.
Grünecker, Kinkeldey, Stockmair &
Schwanhäusser
Anwaltssozietät
Maximilianstrasse 58
80538 München (DE)

(54) Bone setting connecting member

(57) A bonesetting connecting member (1, 17, 19, 21) having an end area supported by a bonesetting tool (5) appropriately mounted to a vertebra (3), thereby connecting the vertebra (3), comprises a polygonal tool engaging portion (11) provided on a body of the bonesetting connecting member (1, 17, 19, 21), and a tool restricting portion (13) for preventing a tool from moving toward opposite sides of the tool engaging portion (11).

FIG.1



EP 1 222 900 A3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 0164

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	WO 00 72768 A (FORTIN FREDERIC) 7 December 2000 (2000-12-07) * the whole document *	1-3, 5, 7, 8	A61B17/70
A	US 5 437 669 A (FREDRICKSON BRUCE E ET AL) 1 August 1995 (1995-08-01) * column 5, line 21 - line 31; figure 1 *	1-8	
A	US 5 306 275 A (BRYAN DONALD W) 26 April 1994 (1994-04-26) * abstract; figures 1,11 *	1,4,6,8	
A	WO 93 14721 A (SALUT LTD) 5 August 1993 (1993-08-05) * abstract; figure 1 *	1,6	
A	US 5 591 165 A (JACKSON ROGER P) 7 January 1997 (1997-01-07) * abstract; figure 18 *	1,8	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A61B
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
BERLIN	10 December 2002	Hansen, S	
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone		T : theory or principle underlying the invention	
Y : particularly relevant if combined with another document of the same category		E : earlier patent document, but published on, or after the filing date	
A : technological background		D : document cited in the application	
O : non-written disclosure		L : document cited for other reasons	
P : intermediate document		& : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.

EP 02 00 0164

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

10-12-2002

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
WO 0072768	A	07-12-2000	FR AU EP WO	2794357 A1 4931900 A 1164956 A1 0072768 A1	08-12-2000 18-12-2000 02-01-2002 07-12-2000
US 5437669	A	01-08-1995		NONE	
US 5306275	A	26-04-1994	US US	5498262 A 5947965 A	12-03-1996 07-09-1999
WO 9314721	A	05-08-1993	US AU AU AU BR CA CN EP FI JP JP KR KR KR MX NO NZ WO US	5300073 A 663918 B2 3332793 A 4189797 A 9207070 A 2129011 A1 1076850 A 0624081 A1 943521 A 2549824 B2 7500760 T 147459 B1 147537 B1 147685 B1 9300405 A1 942793 A 246497 A 9314721 A1 6197028 B1	05-04-1994 26-10-1995 01-09-1993 22-01-1998 05-12-1995 05-08-1993 06-10-1993 17-11-1994 27-07-1994 30-10-1996 26-01-1995 01-08-1998 01-08-1998 01-08-1998 29-07-1994 21-09-1994 24-03-1997 05-08-1993 06-03-2001
US 5591165	A	07-01-1997	FR US AT AU AU CA DE DE EP JP NO WO	2697743 A1 6015409 A 187632 T 682013 B2 5362994 A 2149036 A1 69327345 D1 69327345 T2 0719118 A1 8506025 T 951793 A 9410944 A1	13-05-1994 18-01-2000 15-01-2000 18-09-1997 08-06-1994 26-05-1994 20-01-2000 03-08-2000 03-07-1996 02-07-1996 14-06-1995 26-05-1994

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

THIS PAGE BLANK (USPTO)